NASA SBIR/STTR Technologies

A3.01-9007 - 360-Degree Analysis Engine for Autonomous NAS Operations and Control

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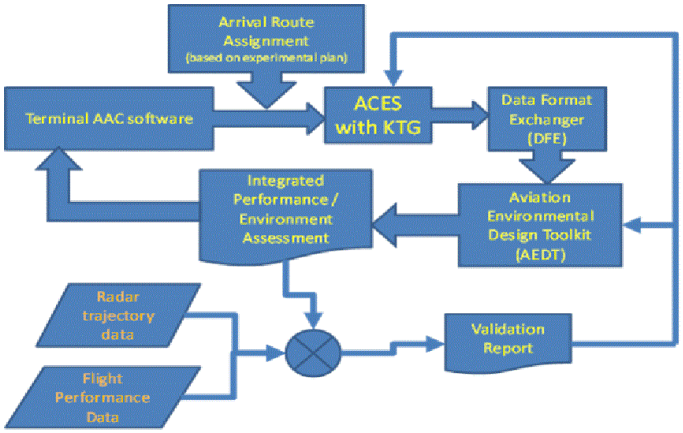
Identification and Significance of Innovation

The chief innovation of this proposal is to develop a verified and validated tool to provide what we call a "360-degree" analysis of a future National Airspace System (NAS) for which separation assurance is provided by automation, the first step towards NAS autonomy. Such a tool is necessary because high density operations in the future?which include Unmanned Aerial Systems (UAS), autonomous cargo and commercial flights?will require a similar degree of ground automation in order to handle the extra traffic load. Continuing to manually control aircraft, as is done today, even with the advanced NextGen systems such as data communication, ADS-B surveillance, and improved voice switching, will become impossible as the use of the airspace system grows and the demand for more traffic increases, possibly exponentially, as flight technology matures and becomes more accessible to the average person.



Estimated TRL at beginning and end of contract: (Begin: 1 End: 2)

Technical Objectives and Work Plan

The main technical objectives of this proposal are as follows:
?To develop a tool for NASA and other researchers that will enable an autonomous NAS to be studied in both the performance and environmental domains (what we call a "360-degree" analysis of autonomy).
?To validate the tool by running it against current operations, using radar data to compare aircraft trajectories and recorded flight data to compare performance indicators.
?To apply the tool to investigate super-dense airspace of the future at a major large airport.
?To install the tool at a NASA location and gather feedback from NASA users.

The work plan involves integrating the Terminal Advanced Airspace Capability (tAAC) and AutoResolver automatic separation assurance algorithms into a fast-time model, integrating that through an external module to an environmental model called AEDT, and using the system to run an analysis at Dallas Ft. Worth International Airport that compares current radar tracks and two types of direct routing in both the performance (delay, flight track length) and environmental (fuel burn, noise, and emissions) domain.

NASA Applications

Under the tool proposed herein,NASA researchers will be able to evaluate both the performance impact and the environmental impact. Some of the research questions that can be answered by such a tool include the following:To what extent does the noise footprint of an automated separation assurance algorithm hinder its acceptance by the public?To what extent is fuel burn reduced by using automated separation assurance?How great a flight density can an automated separation assurance funct. allow?

Non-NASA Applications

Aviation consultants, the FAA itself, and other professionals can use this tool to gain a better understanding of the role of autonomous operations in the NAS. The FAA can use this tool to become acquainted with a partially or fully autonomous NAS operation, to determine to what extent autonomy should be introduced, and on what timetable and what the expected benefits will be.

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